June 12, 1928. 1,673,306

F. O. BALL

CARBURETOR

Filed June 14, 1923 2 Sheets-Sheet 1

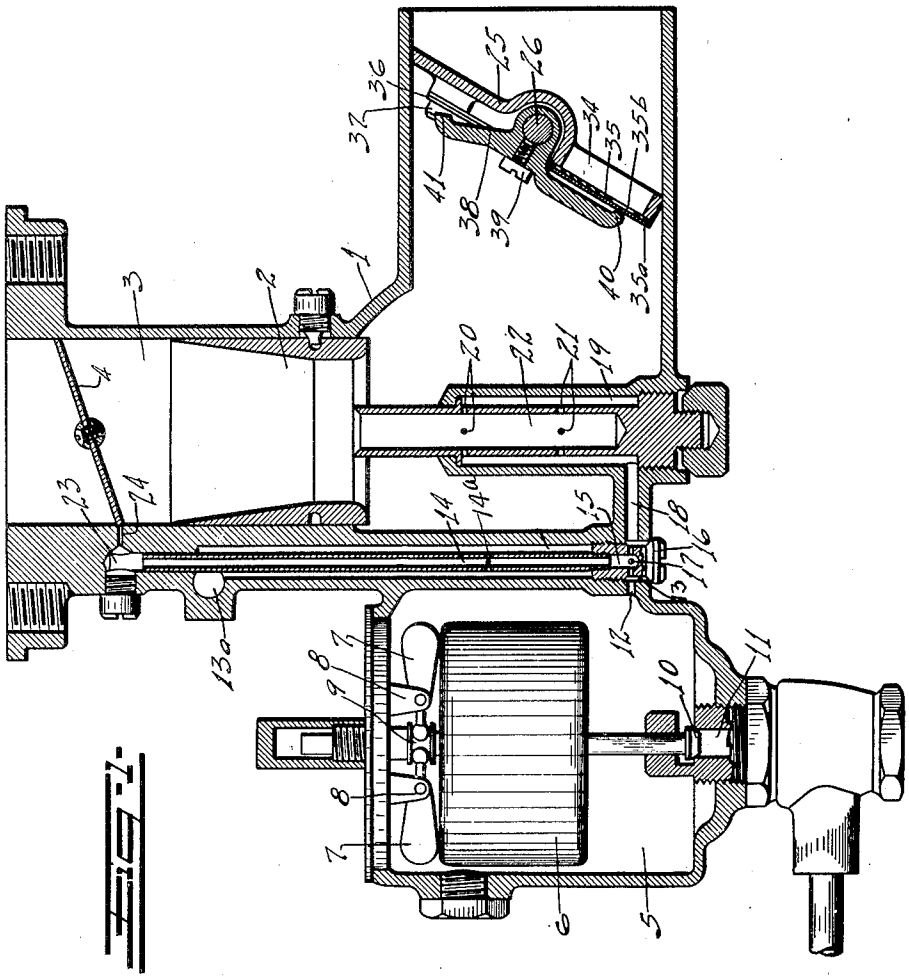

Fig. 1.

Inventor
Frederick O. Ball
By [illegible]
Attorney

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Fig. 2.

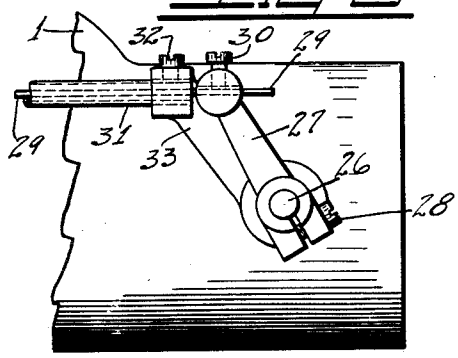


Fig. 3.

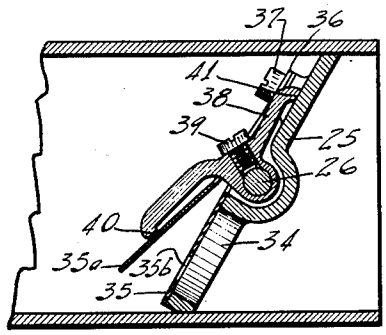


Fig. 4.

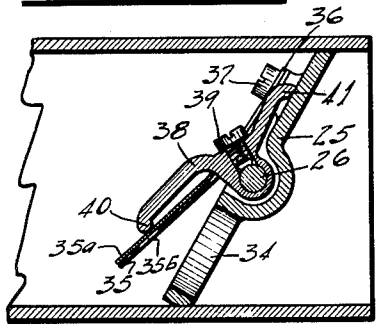


Fig. 5.

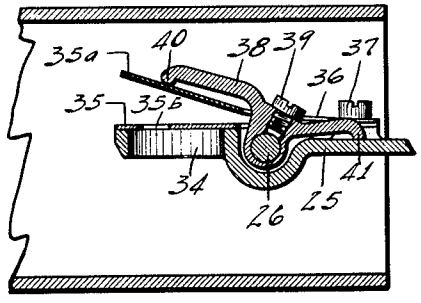
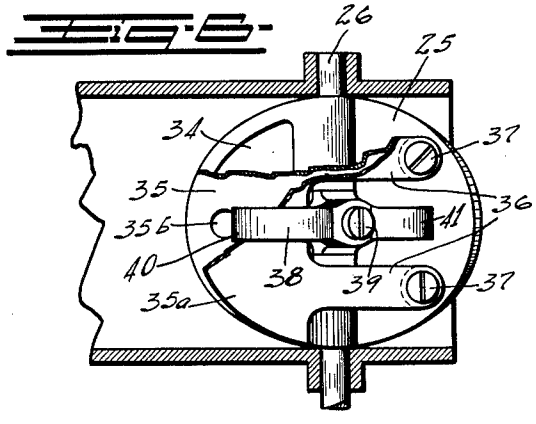


Fig. 6.



Inventor
Frederick O. Ball
By [illegible]
Attorney

Patented June 12, 1928. 1,673,306

UNITED STATES PATENT OFFICE.

FREDERICK O. BALL, OF DETROIT, MICHIGAN, ASSIGNOR TO BALL AND BALL CARBURETOR COMPANY, A PARTNERSHIP COMPOSED OF FREDERICK O. BALL AND CORNELIA M. BALL, OF DETROIT, MICHIGAN.

CARBURETOR.

Application filed June 14, 1923. Serial No. 645,304.

Differences in temperature conditions and qualities of fuel make it desirable to provide carburetors with some simple and readily operable means by which the richness of the mixture may be varied. It has been common, therefore, to provide carburetors with choke valves which when closed increase the suction effort on the fuel delivering passages so that very much more fuel may be delivered with a given portion of air. The ordinary choke valves are faulty, however, in that the functioning of the carburetor is never the same so that while the carburetor may be delivering the desired quality of mixture throughout a very large part of, or all its range with the choke valve open the quality of the mixture does not retain the proper mixture with the variable velocities through the carburetor incident to changing engine speed. As a result the engine only functions well, or with approximately a desirable mixture at about one speed where the choke as ordinarily formed is brought into use. The present invention is designed to correct this fault and to provide the carburetor with a choking mechanism which will assure a proper functioning of the carburetor through quite a range of speed with the choke in operation. Other features of the invention will appear from the specification and claims.

The invention is illustrated in the accompanying drawings as follows:—

Fig. 1 shows a central section through a carburetor showing the construction of choke.

Fig. 2 a side elevation of the portion of the carburetor showing the choke lever mechanism.

Fig. 3 a view of the choke in idling position.

Fig. 4 a view of the choke in full running position with the choke in operation.

Fig. 5 a view with the choke open.

Fig. 6 a horizontal section of the inlet passage showing the choke valve in plan view.

1 marks the body of the carburetor, 2 the Venturi tube, 3 the mixing chamber, 4 the throttle valve, 5 the float chamber, 6 the float operating in the float chamber, 7 the float lever, 8 the float lever bracket, 9 the float valve stem on which the lever operates, 10 a float valve, and 11 the inlet to the float chamber. The fuel passes by an opening 12 to an annular passage 13 and passes from that through radial openings 17 in a closure plug 16 to a tube 14 which reaches upwardly for an idling passage and to a passage 18 leading to a well 19. The fuel passes from the well through openings 20 and 21 to a spray nozzle 22. The tube 14 terminates in an opening 23 in the body leading by way of a passage 24 to the suction passage at a point opposite the edge of the throttle valve when closed. This is what is ordinarily termed the idling passage, the air for spraying the fuel being delivered through an opening 13^a and an opening 14^a in the tube 14. These parts so far as illustrated may be of any desired construction.

A choke valve 25 is arranged at the inlet end of the carburetor extending into the carburetor shown in a horizontal direction and at right angles to the mixing chamber, or passage leading to the mixing chamber. This inlet passage is of a size ordinarily so that when the choker valve opens there is no restriction as compared to the Venturi tube in this part of the passage. The choke valve is loosely mounted on a pin 26 which extends through the walls of the passage. A lever 27 has a split end and is clamped on the pin 26 by means of a screw 28. An operating wire 29 is secured in the lever by means of a screw 30. The wire extends through a guide passage 31 and the guide passage is locked by means of a screw 32 in a mounting 33. This guide wire extends in the usual manner to an operating button in the dash (not shown) and is actuated at the dash in the usual manner of actuating a choke except for a slight variation hereinafter mentioned.

The choke valve has an opening 34 extending through it and this opening is closed by blades 35 and 35^a, the blades having rearward extending projections 36 through

which screws 37 extend securing these auxiliary valve plates on the choker valve. An actuating rocker arm 38 is locked by means of a screw 39 on the pin 26. It is provided with an engaging end 40 which operates against the valve 35ª to close the same when the pin 26 is rocked to the extreme in the closing direction. The rocker 38 has the engaging end 41 which contacts the choker valve and limits the opening movement of the valve 35ª.

The valve 35 which may be termed the auxiliary valve controlling the idling condition has a restricted opening 35ᵇ, this opening having an area designed to give just the right mixture for idling. The plate 35 is slightly curved when released so that when secured by the screws 37 the valve is held in closed position with a very slight tension. The plate 35ª is curved in the opposite direction so as to open when relieved of pressure exerted by the engaging end 40.

In the operation of the device when a full choke condition is desired so as to draw in a mass of fuel for starting conditions the choke is entirely closed by drawing the rocker to its extreme position (as shown in Fig. 1) closing the plate 35ª. As soon as this condition is passed the choker operating means on the wire 29 is slightly relieved and the spring action of the valve 35ª will swing this valve to a position bringing the rocker end 41 into engagement with the choke valve plate. The parts under these conditions assume the position shown in Fig. 3. This will give a desired opening for idling speed and also will take care of the turning over of the engine. In starting the engine, however, as the engine speeds up thus exerting suction effort on the choke valve the idling auxiliary valve immediately opens, thus bringing the parts to the position shown in Fig. 4. The opening 34 acting with the yielding valve will follow up to give the desired quality of rich mixture throughout the range of ordinary running speeds so that the engine will perform while warming up or during excessively cold weather normally with the choke in its closed position giving a complete range of speeds with a properly proportioned mixture.

What I claim as new is:—

1. In a carburetor, the combination of a suction passage; means delivering fuel thereto; and a choke valve at the inlet side of the fuel delivery comprising two spring-actuated auxiliary valves acting successively and controlling valve openings of different area, said auxiliary valves being actuated with the choke valve and independently responsive to suction effort automatically varying the choking action of the choke valve.

2. In a carburetor, the combination of a suction passage; means delivering fuel thereto; and a choke valve at the inlet side of the fuel delivery comprising two spring-actuated auxiliary valves acting successively and controlling valve openings of different area, one valve opening having a capacity for delivering air for idling, said auxiliary valves being actuated with the choke valve and independently responsive to suction effort automatically varying the choking action of the choke valve.

3. In a carburetor, the combination of a suction passage; means delivering fuel thereto; and a choke valve at the inlet side of the fuel delivery comprising two spring-actuated auxiliary valves acting successively and controlling valve openings of different area, said valves overlying each other, said auxiliary valves being actuated with the choke valve and independently responsive to suction effort automatically varying the choking action of the choke valve.

4. In a carburetor, the combination of a suction passage; means delivering fuel thereto; and a choke valve at the inlet side of the fuel delivery comprising two spring-actuated auxiliary valves acting successively and controlling valve openings of different area, said valves overlying each other, and one valve opening having a capacity for delivering air for idling, said auxiliary valves being actuated with the choke valve and independently responsive to suction effort automatically varying the choking action of the choke valve.

5. In a carburetor, the combination of a suction passage; means delivering fuel thereto; and a choke valve at the inlet side of the fuel delivery comprising two spring-actuated auxiliary valves acting successively and controlling valve openings of different area, said valves being in the form of spring plates overlying each other, one of said plates having a smaller valve opening, said auxiliary valves being actuated with the choke valve and independently responsive to suction effort automatcally varying the choking action of the choke valve.

6. In a carburetor, the combination of a suction passage; means delivering fuel thereto; a swinging choke valve at the inlet side of the fuel delivering means comprising a main valve and a double auxiliary valve mounted on the main valve controlling openings of different areas, said auxiliary valves being in the form of spring plates, one plate being superposed upon the other; and a rocker acting on said plates and having limited movement controlling said plates independently of the choke valve.

7. In a carburetor, the combination of a suction passage; means delivering fuel thereto; a swinging choke valve at the inlet side of the fuel delivery, said choke valve having an auxiliary valve opening therethrough and comprising a main valve and a double auxiliary valve mounted on the main valve, said

auxiliary valve being in the form of spring plates arranged over the opening in the choke valve, said plates being superposed and the plate next the opening normally closing on the opening in the choke valve and having a restricted opening therethrough, the plate over the restricted opening being under tension to assume an open position when released; and a rocker swinging relatively to the choke valve operating the choke valve and the auxiliary valves, said rocker having a movement relatively to the choke valve to permit the controlling of the auxiliary valves independently of the choke valve.

In testimony whereof I have hereunto set my hand.

FREDERICK O. BALL.